CLAIMS

What is claimed is:

1. In an exhaust-operated brake system for an internal combustion engine, the improvement comprising:

a valve configured for disposition in an enclosed path transmitting an exhaust stream from said engine, said valve being configured to provide substantially restriction-free passage of said exhaust stream through a first passageway, comprising a conduit disposed through a seal member, when said seal member is oriented in a first position, and to provide an increased restriction through a second passageway, to increase a back-pressure in said exhaust stream, operable to resist high-rpm-rotation of said engine while permitting operational rotation of said engine at an idle-speed, when said seal member is rotated into a second position, wherein:

said seal member is configured and arranged such that, at said second position, an axis of said conduit is disposed substantially at right angles to an exhaust stream flow direction at an inlet into said valve.

2. The improvement of claim 1, wherein said valve comprises:

a clamshell housing defining a cavity and third and fourth orthogonal passageways disposed to intersect approximately at a center of said cavity, said third passageway defining said inlet and an outlet for said exhaust, with a first seal surface arranged to circumscribe a junction between said inlet and said cavity;

a said seal member being disposed in said cavity, said seal member being supported between first and second stub axles, said first and second stub axles being disposed for rotation about an axis in common with said fourth passageway to orient a second seal surface, carried by said seal member, in non-contacting harmony with said first seal surface when said seal member is disposed at said second position; and

a linkage system arranged to rotate said seal member between said first position and said second position.

3. The improvement of claim 2, further comprising:

an occludable conduit disposed through a wall of said inlet and operable to provide access to measure a back-pressure of said exhaust.

4. The improvement of claim 2, further comprising:

a seal face, circumscribed by said second seal surface, carrying an aperture in fluid communication with said second passageway, said aperture being sized in harmony with a bypass area disposed between said first and said second seal surfaces to permit operational rotation of said engine at an idle-speed of said engine when said seal member is at said second position.

5. The improvement of claim 4, wherein:

said aperture is sized to accommodate a particular size said engine.

6. The improvement of claim 5, wherein:

said seal face is adapted to interface with an assortment of removable plugs, each said plug providing an aperture of a different size; and

further comprising a said plug arranged to interface with said seal face.

7. The improvement of claim 2, wherein:

one end of said fourth passageway carries a thimble housing configured as a plug to resist passage of said exhaust through said one end; and

an opposite end of said fourth passageway caries an open housing adapted to receive passage therethrough of an axle shaft, with a high temperature o-ring seal being disposed to resist bypass of said exhaust along said axle shaft and through said opposite end.

8. The improvement of claim 7, wherein:

said thimble housing carries a first bushing installed in an interference fit;

said open housing carries a second bushing installed in an interference fit;

said first stub axle holds a third bushing installed in an interference fit;

said second stub axle holds a fourth bushing installed in an interference fit; and

said first and said third bushings, and said second and said fourth bushings, are mutually arranged to assemble in a slip-fit arrangement to form a first rotatable bearing

between said first and third bushings, and a second rotatable bearing between said second and fourth bushings.

9. The improvement of claim 8, further comprising:

a high-temperature anti-seize lubricant disposed to lubricate said first bearing and said second bearing.

10. The improvement of claim 8, further comprising:

a first thrust washer disposed between a body of said seal member and said first bushing;

a second thrust washer disposed between a body of said seal member and said second bushing; wherein:

said thrust washers are spaced apart in a said valve such that an installed said seal member is permitted an axial play of about 0.035 inches between said first thrust washer and said second thrust washer when measured at an ambient temperature.

11. The improvement of claim 10, wherein:

each of said first, second, third, and fourth bushing is made of hardened steel; and

said slip fit is formed by a difference in diameter, between an installed inner bushing and an installed outer bushing, of between about 0.002 inches to about 0.005 inches.

12. The improvement of claim 2, wherein:

said housing and said seal member are formed as metal components having similar coefficients of thermal expansion; and

said stub axles are formed as an integral part of said seal member.

13. The improvement of claim 2, wherein:

said clamshell housing comprises interlocking front and rear sections adapted for assembly along an axis approximately parallel to a line drawn between a center of said inlet and a center of said outlet, an abutting flange surface carried by each of said front and rear section providing a datum from which axially to space apart said first seal surface from a rear housing seal surface, a male cylindrical lip carried by one of said front section and said rear section being received in cooperating structure carried in the other of said front section and said rear section operable vertically to align said first seal surface and said rear housing seal surface

with respect to said second seal surface and a rear seal surface carried by said sealing member.

14. The improvement of claim 2, further comprising:

an exhaust deflector disposed to protrude inward radially around a discharge end of said inlet effective to increase a pressure drop in an exhaust stream moving between said first seal surface and said second seal surface.

15. The improvement of claim 14, wherein:

said inlet has an inside diameter of about 3.75 inches;

said first seal surface comprises a section of a first sphere having a first diameter of about 5.5 inches, and said second seal surface comprises a section of a second sphere having a second diameter smaller than said first diameter by about 0.04 inches.

16. An exhaust-operated brake for an internal combustion engine, comprising:

a valve adapted to receive an exhaust stream from said engine, said valve being configured to provide substantially insignificant back-pressure to said exhaust stream when a seal member is oriented at a first position, and to provide a restriction operable to increase a back-pressure in said exhaust stream to resist high-rpm-rotation of said engine while permitting operational rotation of said engine at an idle-speed when said seal member is rotated to a second position, said valve comprising:

a housing defining a cavity and first and second orthogonal passageways disposed to intersect approximately at a center of said cavity, said first passageway defining an inlet and an outlet for said exhaust, with a first seal surface configured and arranged to circumscribe a junction between said inlet and said cavity;

said seal member being supported by first and second integral stub axles for rotatable disposition inside said cavity, said first and second stub axles being arranged for rotation about an axis in common with said second passageway to dispose a second seal surface in non-contacting harmony offset from said first seal surface when said seal member is at said second

position, a conduit being disposed as a passageway through said seal member with one opening to said conduit being circumscribed by said second seal surface, said conduit being placed into axial congruence with, and disposed between, said inlet and said outlet when said seal member is at said first position; with

an exhaust deflector disposed to protrude inward radially around a discharge end of said inlet to increase a pressure drop in an exhaust stream moving between said first seal surface and said second seal surface; and

a linkage system arranged to rotate said seal member between said first position and said second position, wherein:

said housing and said seal member are structured and arranged to provide comparable thermally induced expansion operable to avoid contact between said first seal surface and said second seal surface in a range of operating temperatures between ambient temperature and an increased steady-state temperature of said valve resulting from operating said engine.

17. The brake of claim 16, wherein:

said first seal surface is configured as a section of a first spherical surface and said second seal surface is configured as a cooperating section of a second spherical surface of smaller diameter than said first spherical surface.

18. The brake of claim 16, wherein:

a breakover edge is disposed between said second seal surface and a relief area formed in said seal member, said edge being operable to scrape a build-up of exhaust particles from said first seal surface to clean said valve.

19. The brake of claim 16, wherein:

a bearing arrangement for respective first and second stub shafts comprises:

a first bushing installed in an interference fit with structure associated with said second orthogonal passageway of said housing;

a second bushing installed in an interference fit on said respective stub shaft; and

said first and said second bushings are mutually arranged to assemble in a slip-fit arrangement to form a rotatable bearing between said first and said second bushings; with:

a high-temperature anti-seize lubricant disposed between said first and second bushings.

20. The brake of claim 16, further comprising:

a seal face, bounded by said second seal surface, said seal face carrying an aperture in fluid communication with said conduit, said aperture being sized in harmony with an exhaust bypass area between said first and second seal surfaces to permit operational rotation of said engine at an idle-speed of said engine.